CLAIMS

What is claimed is:

1. A method for supporting inductive communication, the method comprising the steps of:

   coupling a transducer to a selected first or second circuit for either transmitting or receiving;

   adjusting electrical characteristics of the first circuit to increase a magnetic field generated by the transducer;

   adjusting electrical characteristics of the second circuit to increase a signal generated by the transducer.

2. A method as in claim 1, wherein the characteristics of the first and second circuits are adjusted using passive circuit components.

3. A method as in claim 1 further comprising the steps of:

   transmitting a magnetic field over the transducer when the transducer is coupled to the first circuit; and

   receiving a magnetic field over the transducer when the transducer is coupled to the second circuit.

4. A method as in claim 1 further comprising the step of:

adjusting a capacitance of the first circuit to reduce an effective impedance of the transducer for transmitting; and

adjusting a capacitance of the second circuit to increase an effective impedance of the transducer for receiving.

5. A method as in claim 1 further comprising the step of:

time division multiplexing the transducer between the first and second circuits to support bidirectional communication with a transceiver at a remote location.

6. A method as in claim 1, wherein the electrical characteristics of the first and second circuits are adjusted to achieve an efficient coupling between either a transmitter or receiver.

7. A method as in claim 1 further comprising the step of:

adjusting a reactance of the first circuit to transmit a magnetically encoded signal at a first carrier frequency and adjusting characteristics of the second circuit to receive a magnetically encoded signal at a second carrier frequency.

8. A method as in claim 1 further comprising the step of:

disposing an inductive element in the second circuit, the inductive element having an approximate inductance as that of the transducer.

9. A method as in claim 1, wherein the second circuit includes at least a portion of the first circuit that is coupled via a switch.

10. A method as in claim 1, wherein the first circuit serially tunes the transducer for transmitting over the transducer and the second circuit parallel tunes the transducer for receiving over the transducer.

11. A method for supporting communication, the method comprising the steps of:

switching to select either transmitting or receiving over a transducer;

via a first circuit, effectively tuning the transducer to be a low impedance device for generating a magnetic field when a transmitter is switched to transmit over the transducer;

via a second circuit, effectively tuning the transducer to be a high impedance device for receiving a magnetic field when a receiver is switched to receive over the transducer.

12. A method as in claim 11 wherein the first circuit is serially tuned for transmitting over the transducer and the second circuit is parallel tuned for receiving over the transducer.

13. A method as in claim 11 further comprising the step of:

in a transmitting mode, reducing an overall reactance of the first circuit including the transducer by substantially matching an inductance of the transducer with a capacitance provided by the first circuit.

14. A method as in claim 11 further comprising the step of:

via switching, decoupling the transmitter from the first circuit and transducer, and coupling the receiver and portion of the second circuit to the first circuit and the transducer.

15. A method as in claim 11 further comprising the step of:

from the transmitter, generating an output at one of two voltages that is coupled to drive the transducer.

16. A method as in claim 11 further comprising the step of:

disposing a resistance in series with the transducer.

17. A method as in claim 11 further comprising the step of:

tuning a combined impedance of the first circuit and transducer for maximal magnetic power output of the transducer at a particular carrier frequency.

18. A method as in claim 11 further comprising the step of:

adjusting an impedance of the first and second circuit to transmit and receive over the transducer at a substantially similar carrier frequency.

19. A method as in claim 11 further comprising the step of:

varying inductive characteristics of the transducer to adjust a combined impedance of the first circuit and transducer.

20. A method as in claim 11 further comprising the step of:

adjusting a reactance of the first or second circuits by switching selected capacitors of a capacitor bank.

21. A method as in claim 11 further comprising the steps of:

positioning a second transducer to receive a portion of a magnetic signal transmitted from the transducer; and

while driving a combination of the first circuit and transducer with the transmitter, adjusting a reactance of the first circuit to receive a maximal signal at the second transducer.

22. A method as in claim 11, wherein information is transmitted and received over the transducer based on time division multiplexing.

23. A method as in claim 22, wherein the transducer supports half-duplex communication with a remote transceiver.

24. A method as in claim 11 further comprising the step of:

in a receiving mode, coupling at least a portion of the first circuit to the second circuit via a switch and decoupling the transmitter from at least a portion of the first circuit and transducer.

25. A method as in claim 11 further comprising the steps of:

decoupling the transmitter from the first circuit and transducer; and

coupling at least a portion of the first circuit and transducer to the second circuit, at least a portion of reactance of the first and second circuit substantially canceling each other.

26. A method as in claim 11, wherein a combined reactance of the second circuit coupled with at least a portion of the first circuit is reduced via an inductor matched with an inductance of the transducer.

27. A method as in claim 11 further comprising the step of:

disposing an electronic switch circuit between an output of the transmitter and the first circuit for coupling and decoupling the transmitter to the first circuit.

28. A method as in claim 11 further comprising the steps of:

providing switching capability to select which of multiple transducers to transmit and receive a magnetically encoded signal;

depending on which transducer is selected, adjusting an impedance of the first or second circuit.

29. A method as in claim 28 further comprising the steps of:

adjusting a reactance of the first circuit depending on a selected one of the multiple transducers to minimize an overall impedance of the selected transducer and first circuit; and

driving a combination of the selected one of the multiple transducers and the first circuit with the transmitter.

30. A method as in claim 28 further comprising the step of:

disposing the multiple transducers to be substantially orthogonal to each other.

31. A method as in claim 28 further comprising the step of:

switching the first and second circuit to transmit on one transducer while receiving on another transducer.

32. A method as in claim 31 further comprising the step of:

switching the second circuit and receiver to receive on a different transducer when no signal is received on a particular transducer.

33. A method as in claim 11 further comprising the steps of:

setting switch circuitry to receive over the transducer;

transmitting a signal at a particular carrier frequency on a second transducer whose output couples to the transducer; and

adjusting a reactance of the second circuit to receive a maximum signal over the transducer.

34. A method as in claim 11 further comprising the step of:

disposing a switch at an output of the transmitter to couple the transmitter to the first circuit and transducer.

35. A method as in claim 11 further comprising the step of:

switching to a receiving mode to receive over the transducer; and

increasing an effective impedance of the transducer to receive an optimal signal at the receiver.

36. A method for supporting communication comprising the steps of:

switching to select one of multiple circuit paths for either transmitting or receiving over a transducer via inductive coupling;

reducing an overall impedance of a first circuit path including the transducer to transmit an inductive signal over the transducer; and

reducing an overall impedance of at least a portion of a second circuit path including a switch for receiving an inductive signal over the transducer.

37. A method as in claim 36 further comprising the steps of:

switching a transmitter to transmit over the transducer via the first circuit path; and

reducing an overall impedance of the first circuit path including the transducer by substantially matching an impedance of the transducer with circuit components disposed along the first circuit path.

38. A method as in claim 37, wherein the circuit components along the first path includes at least one capacitor to reduce an overall impedance of the first circuit.

39. A method as in claim 36 further comprising the step of:

disposing the second circuit path to include at least a portion of the first circuit path; and

decoupling the transmitter from the first circuit path via a first switch.

40. A method as in claim 39 further comprising the step of:

coupling a receiver to the second circuit path via a second switch for receiving over the transducer; and

reducing at least a portion of a reactance along the second circuit path including the transducer by substantially matching a reactance of the transducer with at least one circuit component disposed along the second circuit path.

41. A method as in claim 40, wherein the second circuit path includes at least one serially disposed inductive element.

42. A method as in claim 41, wherein an inductance of the serially disposed inductive element

substantially matches an inductance of the transducer.

43. A method as in claim 36, wherein the second circuit path includes a serially disposed switch.

44. A method as in claim 36 further comprising the step of:

tuning a combined reactance along the first circuit path including the transducer for maximal magnetic power output of the transducer at a particular carrier frequency.

45. A method as in claim 36 further comprising the steps of:

positioning a second transducer to receive a portion of a magnetic signal transmitted from the transducer; and

while driving the transducer via a connection through the first circuit path, adjusting an impedance along the first circuit path to receive a maximal signal over the second transducer.

46. A method as in claim 36 further comprising the steps of:

selecting among which of multiple transducers to transmit and receive information;

depending on which transducer is selected, adjusting an impedance along a corresponding circuit

path to respectively transmit or receive over the selected transducer.

47. A method as in claim 46 further comprising the step of:

disposing the multiple transducers to be substantially orthogonal to each other.

48. A method as in claim 36 further comprising the steps of:

coupling a receiver to the second circuit path for receiving over the transducer;

transmitting a signal at a particular carrier frequency on a second transducer whose output couples to the transducer; and

adjusting a reactance along the second circuit path to receive a maximum signal at the receiver.

49. A method as in claim 36 further comprising the step of:

reducing a reactance of a portion along the second circuit path for receiving over the transducer.

50. A method as in claim 49 further comprising the step of:

tuning the transducer with a capacitance in parallel with the transducer.

51. A method for supporting communication comprising the steps of:

coupling one of multiple transducers to a circuit to transmit or receive a magnetic field; and

adjusting characteristics of the circuit depending on which of the multiple transducers is coupled to the circuit.

52. A method as in claim 51, wherein a capacitance of the circuit is adjusted to tune the transducer.

53. A method as in claim 51, wherein the circuit is adjusted to independently tune the transducer for transmitting or receiving at different time intervals.

54. A method as in claim 51 further comprising the step of:

selecting a setting of the circuit via electronic switching to tune the transducer.

55. A method as in claim 51 further comprising the step of:

positioning each of the multiple transducers along a unique axis with respect to each other.

56. A method as in claim 51 further comprising the step of:

orthogonally positioning three transducers with respect to each other.

57. A method as in claim 55 further comprising the step of:

selecting from which of the multiple transducers to transmit or receive a magnetic field; and

tuning the selected transducer to support a wireless link with a remote transceiver device having a single transducer that transmits and receives data.

58. A method as in claim 51 further comprising the step of:

adjusting an impedance of the circuit to tune a transducer for transmitting or receiving.

59. A method as in claim 51 further comprising the step of:

coupling a first transducer of the multiple transducers to the circuit for transmitting;

coupling a second transducer of the multiple transducers to the circuit for receiving; and

transmitting a signal over the first transducer and receiving the signal over the second transducer.

60. A method as in claim 59 further comprising:

tuning the first transducer and the circuit for transmitting a magnetic field based on feedback from the second transducer receiving the magnetic field.

61. A method as in claim 59 further comprising:

tuning the second transducer and the circuit for receiving based on a received signal strength of a magnetic field generated by the first transducer.

62. A method as in claim 51 further comprising:
sweeping through a range of circuit settings to determine which of multiple settings is optimal for transmitting or receiving over a selected transducer.

63. A method as in claim 51 further comprising:
reducing power consumption of the circuit by increasing a magnetic signal generated by a selected transducer based upon adjustments to the circuit.

64. A method as in claim 51 further comprising:
switching selected capacitors of a capacitor bank to ground via switches to tune a transducer for transmitting or receiving.

65. A method as in claim 51 further comprising:
storing circuit setting information in memory regarding how to set a circuit for receiving or transmitting.

66. A method as in claim 62 further comprising:
learning which of multiple settings is optimal and storing corresponding information in memory.

67. A method as in claim 51 further comprising:

retrieving circuit setting information from memory and adjusting characteristics of the circuit to transmit or receive over a transducer.

68. A method as in claim 51 further comprising:

intermittently adjusting characteristics of the circuit during use based upon feedback to more efficiently transmit or receive over one of the multiple transducers.

69. A method as in claim 51 further comprising:

adjusting the circuit to transmit or receive over the transducer at a selected carrier frequency.

70. A method as in claim 69 further comprising:

modulating digital data on the carrier frequency to transmit information to a target receiver.

71. A method for supporting inductive communication comprising the steps of:

coupling a transducer to a circuit to transceive a magnetic field; and

adjusting characteristics of the circuit to transceive over the transducer.

72. A method as in claim 71, wherein a capacitance of the circuit is adjusted to tune the transducer.

73. A method as in claim 71, wherein the circuit is adjusted to independently tune the transducer for transceiving an inductive signal.

74. A method as in claim 71 further comprising the step of:

selecting a setting of the circuit via electronic switching to tune the transducer.

75. A method as in claim 71 further comprising:

sweeping through a range of circuit settings to determine which of multiple settings is optimal for transceiving over the transducer.

76. A method as in claim 71 further comprising:

reducing power consumption of the circuit by adjusting the circuit for generating a more efficient magnetic signal.

77. A method as in claim 71 further comprising:

switching selected capacitors of a capacitor bank to ground via switches to tune the transducer for transceiving.

78. A method as in claim 71 further comprising:

storing circuit setting information in memory regarding how to set a circuit for transceiving over the transducer.

79. A method as in claim 71 further comprising:

learning which of multiple settings is optimal for transceiving over the transducer and storing corresponding information in memory.

80. A method as in claim 71 further comprising:
retrieving circuit setting information from memory and adjusting characteristics of the circuit to transceive over the transducer.

81. A method as in claim 71 further comprising:
intermittently adjusting characteristics of the circuit during use based upon feedback to more efficiently transceive over the transducer.

82. A method as in claim 71 further comprising:
adjusting the circuit to transceive over the transducer at a selected carrier frequency.

83. A method as in claim 82 further comprising:
modulating digital data on the carrier frequency to transmit information to a target receiver.

84. A method as in claim 71 further comprising:
switching an inductor in series with the transducer to tune the transducer for receiving a magnetic field.